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RICE HULLS AND RICE STRAW, 1907-1944

A List of References

Compiled by Kyle Ward, Jr.
Revised and checked by J. David Reid and Dorothy Nicely,
Southern Regional Research Laboratory, Bureau of
Agricultural and Industrial Chemistry
Edited by Corabel Bien, Library

This bibliography covers the literature as reported in Chemical Abstracts, v. 1, 1907 through v. 39, 1945. It is in two parts. The first part contains references on rice hulls, the second, references on rice straw. References covering both subjects are listed in both parts. In general, food uses, particularly the extensive work on vitamins from rice polishings, have not been included.

Subject references in the index with numbers below 77 refer to rice hulls, those above 76 refer to rice straw.

Items marked with an asterisk (*) have not been examined. Call numbers are those of the U. S. Department of Agriculture Library unless otherwise noted.

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RICE HULLS

1. BANERJEE, S. L., and GOSWAMI, M. Activated carbon from raw materials available in India. Indian Chem. Soc. Jour., Indus. & News Ed. 3: 75-79. 1940. 385 In27A

   Chem. Abs. 35: 1600. 1941.

   The product of carbonization of rice hulls at 800° was most effective in decolorizing caramel solutions at pH 4.5.

2. *BELLADEN, L., and GALLIANO, G. The ash of rice chaff as raw material for refractory insulators. Metall. Ital. 33: 349-352. Aug. 1941.

   Chem. Abs. 37: 3895. 1943.

   Abstract in Chem. Zentbl. 113 (I. halbjahr): 2179. Apr. 29, 1942. 384 C42

   Bricks formed of this material make good heat insulation.

3. BERTRAND, G., and BROOKS, G. Analyse et composition des tissus végétaux lignifiés pailles, fibres, coques, etc. France. Min. des Trav. Pub. Off. Natl. des Combustibles Liquides. Ann. 12: 905-921. Sept./Oct. 1937. U. S. Geol. Survey Libr.

   Chem. Abs. 32: 3145. 1938.

   Abstract in Paris. Acad. des Sci. Compt. Rend. 206: 293-295. Jan. 31, 1938. 505 P21

   Analysis and composition of lignified vegetable tissues, straws, fibers, hulls, including rice hulls, etc. Data on moisture; ash; total N; extraction by H_2O, EtOH, and Et_2O; hydrolysis by dilute acid and NaOH; and reducing sugars and cellulose are given.

4. BERTRAND, G., and BROOKS, G. Le rendement en furfural de divers tissus lignifiés. Paris. Acad. des Sci. Compt. Rend. 214: 295-297. Feb. 16, 1942. 505 P21

   Chem. Abs. 37: 6261. 1943.

   Yield, on distillation with dilute acid, of 2-furaldehyde from lignified tissues is given, that for rice hulls being 6.94%

5. BLARDONE, G. Alkali metal silicates from rice hulls. U. S. Pat. 1,293,008, Feb. 4, 1919.

   Chem. Abs. 13: 1132-1133. 1919.

6. BLARDONE, G., and FORNARIS, J. M. A vegetable equivalent for bone black in sugar refining. La. Planter 58: 379. June 16, 1917. 65.8 L93

   Chem. Abs. 11: 3459. 1917.

   Decolorizing substance from rice hulls.

7. BLARDONE, G. G., NICHOLS, C. W., and BRUGUIERE, F. A substitute for lampblack. U. S. Pat. 1,156,742, Oct. 12, 1915.

   Chem. Abs. 9: 3334. 1915.

   From rice hulls and chaff.

8. BORASIO, L. La pula di riso e la sua composizione chimica. Gior. di Risic. 19: 58-61. Apr. 1929. 59.8 G43

   Chem. Abs. 23: 4752. 1929.

   Rice "pula" (meal from the first and second pearling machines) and its chemical composition. These hulls, with polishings added, may be used as feed for cattle.

9. BORASIO, L. Sulla composizione chimica della lolla di riso. Gior. di Risic. 18: 48-50. Mar. 1928. 59.8 G43
   Chem. Abs. 22: 2415. 1928.
   Chemical composition of rice hulls which are 18-20% of rough rice and contain 41-43% crude cellulose. The best possible utilization of rice hulls is for the production of gas, charcoal, tar, and AcOH by dry distillation. They are useless for feeding or paper making and have little value as fertilizer or animal bedding.

10. BUATIER DE MONGEOT, L. Sul razionale impiego del pulone di riso. Gior. di Chim. Indus. ed Appl. 12: 74-76. Feb. 1930. 385 G43
   Chem. Abs. 24: 5086. 1930.
   On the utilization of rice hulls which consist of 60.04% volatile matter, 24.79% carbonaceous matter, and 15.17% ash. Use of siliceous ash is suggested in the glass industry. Dry distillation of hulls gives C of low density and a liquid in which acetic and propionic acids, furfuraldehyde, phenol, and cresols were identified. Microscopical examination shows hulls rich in cellulose and they are suggested as a source of industrial alcohol.

11. CHOKKANNA, N. G., and NARAYANAN, B. T. Activated carbon from paddy husk. Current Sci. [India] 6: 617. June 1938. 475 Sci23
   Chem. Abs. 32: 7684. 1938.
   Paddy husk is suitable material for the manufacture of activated C by treatment with $ZnCl_2$.

12. CHOWDHURY, J. K., CHAKRAVARTY, K. M., and BHATTACHARYYA, A. K. Preparation of activated carbon from rice and betelnut husks. Part I. Activation with zinc chloride. Part II. Activation with steam and carbon dioxide. Indian Chem. Soc. Jour., Indus. & News Ed. 4: 72-82. 1941. 385.8 In27A
   Chem. Abs. 36: 248. 1942.
   Yield of activated C was greater from rice hulls than from betelnut hulls. A mixture of CO_2 and steam gave a very satisfactory yield with an activity appreciably higher than the carbons obtained by other methods of activation.

13. CRUZ, A. O., and WEST, A. P. Decolorizing carbon and sodium silicate from Philippine carbonaceous rice-hull ash. Philippine Jour. Sci. 70: 143-156. Oct. 1939. 475 P53
   Chem. Abs. 34: 2143. 1940.
   A method of making in one process both decolorizing C and sodium silicate from carbonaceous ash obtained by burning rice hulls.

14. DARLING, E. R. (to Euromerican Cellulose Products Corp). Cellulose pulp from corn stalks, straw, etc. Brit. Pat. 314,061, June 22, 1928.
   Chem. Abs. 24: 1219. 1930.
   Description of preparation of pulp from materials such as rice hulls and straw.

15. FONTILLAS, S. M. Determination of furfural from some farm by-products. Philippine Agr. 30: 300-313. Sept. 1941. Ref., p. 308-309. 25 P542
   Chem. Abs. 36: 2347. 1942.
   From rice hulls mixed with broken kernels, 17.05%; whole rice hulls, 13.79%; rice straw with rachis, 16.58%.

16. FRAPS, G. S. The composition of rice and its by-products. Tex. Agr. Expt. Sta. Bul. 191, 41 p. Austin, 1916. 100 T31S
    Chem. Abs. 11: 3346-3347. 1917.
    Hulls have very low feed value.
17. FRENCH, M. H. The value of rice by-products for feeding to ruminants. Tanganyika. Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 1937: 101-105. 1938. 41.9 T15
    Chem. Abs. 33: 1828-1829. 1939.
    Rice hulls gave extremely low values.
18. FRENCH, M. H. The value of rice by-products for pig feeding. Tanganyika. Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 1937: 98-100. 1938. 41.9 T15
    Chem. Abs. 33: 1828-1829. 1939.
19. GARELLI, F. Il grasso della pula di riso. Ann. di Chim. Appl. [Rome] 8: 109-114. 1917. 385 An7
    Chem. Abs. 12: 1003. 1918.
    The commercial treatment of rice hulls by extracting fat with solvents is impractical at the present time.
20. GYORGY, P., and TOMARELLI, R. Antioxidant activity in sources of the B vitamins. Jour. Biol. Chem. 147: 515-524. Mar. 1943. Ref. 381 J824
    Chem. Abs. 37: 6349. 1943.
    Antioxidants of rice bran.
21. HARDING, E. R. Cereal cellulose, a roughage material suitable for experimental animal diets. Science (n. s.) 95: 234. Feb. 27, 1942. 470 Sci2
    Chem. Abs. 36: 2949. 1942.
    The cellulose derived from rice hulls shows the following percentage composition: N 0.043; ash 0.71; Ca 0.022; P nil; Fe 0.001; Al 0.016; and SiO_2 0.42.
22. HARDING, E. R. Properties and uses of an edible rice cellulose. Indus. and Engin. Chem. 20: 310-311. Mar. 1928. 381 J825
    Chem. Abs. 22: 1413. 1928.
    Edible cellulose from rice hulls by cooking with soda, and subsequent hydration treatment. The product is cream color, mealy, odorless, and tasteless. 1% ash and high % of alpha- and hydrated celluloses. Dietary test indicated value. Used in manufacture of breakfast food.
23. HITIZYO, K. Artificial slates. Jap. Pat. 128,357, Jan. 18, 1939.
    Chem. Abs. 34: 8116. 1940.
    Hemp cloth is immersed in a gelatin solution at low temperature and dried. A paste of MgO, $MgCO_3$, ground rock, rice hull, $MgCl_2$, gelatin solution, and a small amount of organic acids with or without pigments is coated on both sides of base material and pressed.
24. HUMBOLDT-DEUTZMOTOREN A.-G. Gas producer for using rice husks and similar vegetable wastes. German Pat. 592,608, Feb. 10, 1934 (Cl. 24c. 5). See Brit. Pat. 392,498 (Chem. Abs. 27: 5520).
    Chem. Abs. 28: 3565. 1934.
25. HUMBOLDT-DEUTZMOTOREN A.-G. Gas producer for using vegetable wastes, e. g., rice husks, nut shells or shells of cacao, coffee or palm kernels. Brit. Pat. 392,498, May 18, 1933.
    Chem. Abs. 27: 5520. 1933.

26. ISSOGLIO, G. La composizione chimica dei cascami della lavorazione del riso. Nota II. R. Accad. delle Sci. Torino. Atti 54: 980-991. 1919. U. S. Natl. Mus. Libr.

    Chem. Abs. 14: 1168. 1920. Cf. 13: 622. 1919.

    Chemical composition of the byproducts from the working up of rice showed the hulls to be rich in cellulose but poor in nutrition.

27. ITANO, A., and ARAKAWA, S. Some scientific consideration on the Itano process of composting. I. General description, nature of fermentation and sanitary significance. Ōhara Inst. f. Landw. Forsch. Ber. 3: 497-504. 1928. 107.6 Oh1

    Chem. Abs. 22: 3480-3481. 1928.

    The chemical composition of composts made from rice straw, barley straw, rice hulls, and weeds, average: total N 2.00 + K 1.44 and phosphates 0.85%.

28. JACOBS, P. B. Destructive distillation of agricultural wastes. Indus. and Engin. Chem., Indus. Ed. 32: 214-226. Feb. 1940. Ref. 381 J825

    Chem. Abs. 34: 1840. 1940

    Product composition, yields, and uses of products of destructive distillation are discussed, as applied to rice hulls, etc.

29. KAZITA, S., and INOUE, R. (to Sōyowa Sangyō K. K.) Artificial fibers from bran. Jap. Pat. 132,664, Oct. 13, 1939.

    Chem. Abs. 35: 3456. 1941.

    Bran or hulls of rice treated with dilute alkali, proteins precipitated washed, dissolved, stabilized, and extruded into a coagulating bath.

30. KIK, M. C. Thiamin in products of commercial rice milling. Cereal Chem. 20: 103-109. Jan. 1943. 59.8 C33

    Chem. Abs. 37: 1785. 1943.

    Hulls contained 1.11 gamma thiamine per gm. of dry matter.

31. *KITSUJO, K. Ferment activity in the hulls of rice. (From Journal of South Manchurian Medical Association, vol. V, No. 3) (In Japanese?) Chuo Igakkai Zasshi (Cent. Med. Assoc. Jour.), No. 273, p. 1148. Mar. 5, 1918.

    Chem. Abs. 15: 1338. 1921.

    Abstract in Jap. Med. Lit. 5(5): 30. 1920. U. S. Army Med. Libr.

    Hulls facilitate growth of the acid-forming bacillus of fermentation.

32. *KRUPITSKAYA, L. S. An investigation of the factors which influence the swelling of Barkalite. (In Russian?) Nauch.-Issled. Lab. i Opytn. Sta. po Barkalaitu. Trudy, No. 1, p. 90-98. 1937.

    Chem. Abs. 34: 5962. 1940.

    Russian (?) abstract in *Khim. Ref. Zhur., No. 6, p. 106-107. 1938.

    Physical properties of Barkalite (a plastic) from rice hulls.

33. LAVA, V. G., and OLAYAO, I. Roasting of Philippine low-grade chromite for the production of sodium bichromate. Philippine Jour. Sci. 69: 197-221. June 1939. Ref. 475 P53

    Chem. Abs. 33: 8932-8933. 1939.

    Minus-20 mesh rice hulls roasted with 150 mesh chromite ore gave optimum H_2O-solution chromium.

34. LEHALLEUR, J. P. Emprego de diversos residuos de industrias brasileiras como adubos. Acad. Bras. Sci. Ann. 1: 183-186. Dec. 31, 1929. U. S. Geol. Survey Libr.

Chem. Abs. 24: 2824. 1930.

Use of industrial residues in Brazil for the fertilizer industry. The tables of analyses, showing compositions, include rice hulls.

35. LEON, A. I. DE, and REYES, R. O. Hydrolysis of some agricultural products. Philippine Univ. Nat. and Appl. Sci. Bul. 6: 193-206. Oct. 1938. Ref., p. 198-199. 475 P532

Chem. Abs. 33: 2609. 1939.

From rice hulls: theoretical furfural, 9.05%; pentoses, 17.44%; pentosans, 15.34%; acetic acid, 0.92%; and formic acid, 0.44%.

36. LEON, A. I. DE, and REYES, R. O. Studies on the utilization of some agricultural waste products. I. Destructive distillation of coconut shells, coconut husks, coconut rachis and petioles and rice hulls at 400°C. Philippine Univ. Nat. and Appl. Sci. Bul. 4: 325-331. Dec. 1935. 475 P532

Chem. Abs. 30: 4308. 1936.

Yield charcoal, tar, and pyroligneous acid. The charcoal as produced cannot be used as a decolorizing agent.

37. LINDSEY, J. B. The effect of sodium hydrate upon the digestibility of grain hulls. Science (n. s.) 55: 131-132. Feb. 3, 1922. 470 Sci2

Chem. Abs. 16: 1471. 1922.

Dilute NaOH increases digestibility of rice hulls for feed. Composition given.

38. MCELHINNEY, T. R., BECKER, B. M., and JACOBS, P. B. Activated carbon from certain agricultural wastes. Iowa State Col. Jour. Sci. 16: 227-239. Jan. 1942. Ref. 470 Io9

Chem. Abs. 36: 4692-4693. 1942.

Activated carbons from rice hulls, produced on a laboratory scale, were substantially equal in quality to commercial carbons with which they were compared.

39. MCGILL, H. T. (one-half to A. U. McGill). Rice-hull composition suitable for cleaning and scouring. U. S. Pat. 2,016,289, Oct. 8, 1935.

Chem. Abs. 29: 8183. 1935.

Rice hulls are mixed with about 2-3% of a hydrocarbon oil or glycerol, which serves as an impregnating and toughening agent.

40. MARCUSSON, J., and PICARD, M. Die trockene destillation von reis- und haferspelz. Chem. Ztg. 47: 585. July 10, 1923. 384 C427

Chem. Abs. 17: 3243. 1923.

In the dry distillation of rice and oat hulls, rice hulls yield 6% oil, 33% aqueous distillate, 41% carbonaceous residue, and 20% gases.

41. MILLER, J. R., and EDWARDS, H. S. Filter for used lubricating oils. French Pat. 835,836, Jan. 4, 1939.

Chem. Abs. 33: 5175-5176. 1939.

The filtering element is composed of a mass of small balls formed of a mixture of fibrous material, e. g., cotton and rice hulls.

42. MINAMI, K. Pulp from printed paper. Jap. Pat. 133,355, Dec. 14, 1939.
Chem. Abs. 35: 4205. 1941.
Paper treated with filtered liquid from the cooking of rice bran to remove printing ink without affecting the quality of the pulp.

43. MORGENIER, R. Paper pulp from rice hulls. U. S. Pat. 1,570,389, Jan. 19, 1926.
Chem. Abs. 20: 823. 1926.
Rice hulls are cooked in a 10° Bé. solution of NaOH for about 2 hours, separated from solution and beaten to pulp.

44. MULLER, H. J. De analyse van eenige afvalproducten der rijstpellerijen in Suriname. Indische Mercuur 58: 593-594. Sept. 25, 1935. 286.8 In2
Chem. Abs. 29: 8157. 1935.
Analyses of certain waste products of Suriname rice show that the hulls do not have the nutritive value of bran as feed.

45. NAGAOKA, Z., WATANABE, A., and YASIRO, Y. The heat conductivity of frozen moist insulator. Inst. Phys. and Chem. Res., Japan. Sci. Papers 34: 1034-1041. Oct. 1938. 513 T577
Chem. Abs. 33: 1834-1835. 1939.
The waterproofing of rice hulls had little effect on their insulating value.

46. NATH, B. V. Waste products of paddy and sugar cane crops. Madras Agr. Jour. 20: 441-443. Nov. 1932. 22 M262
Chem. Abs. 27: 796-797. 1933.
Part of a "Symposium on the utilisation of waste products." Paddy husks can be made into activated carbon.

47. *NATRADZE, A. G. The investigation of the physical factors in the pressure reaction of Barkalite powder. (In Russian?) Nauch.-Issled. Lab. i Opytn. Sta. po Barkalaitu. Trudy 1937: 61-79.
Chem. Abs. 33: 6472. 1939.
Russian (?) abstract in *Khim. Ref. Zhur. 1(7): 85-86. 1938.
Barkalite (thermoplastic resins) from rice hulls.

48. OLD, A. N. Chemical composition of some rice by-products. Agr. Gaz. N. S. Wales 51: 27. Jan. 1940. 23 N472
Chem. Abs. 34: 3834. 1940.
Analysis, for feed, of rice hulls and rice straw.

49. PELAGIO, H., and COSTA, N. DA. Insulating, packing or wrapping material. Brit. Pat. 505,278, May 9, 1939.
Chem. Abs. 33: 9491-9492. 1939.
The resulting product, comprising a base, such as rice hulls, may be rendered waterproof or noninflammable.

50. *POSSENTI, A. Gasification plant for rice hulls in the gas plant of Vercelli. Risicoltura 30: 243-251. Dec. 1941.
Chem. Abs. 37: 3247. 1943.
Abstract in Chem. Zentbl. 113 (I halbjahr): 2614. May 20, 1942. 384 C42
Gasification produces a gas with 1586 calories and a tar with 4943 calories. The gas is blended with coal gas.

51. PUTTAERT, J. F., and PUTTAERT, H. F. J. Fibrous pulp from rice hulls. U. S. Pat. 1,588,335, June 8, 1926.
Chem. Abs. 20: 2584. 1926.
NaOH cook.

52. RAMZIN, L. K. Combustion of fuel fines in state of suspension. World Power Conf., 2, Berlin, 1930. Trans. 7: 171-186. Libr. Cong.
German summary.
Chem. Abs. 25: 4684-4685. 1931.
Results of combustion tests on rice hulls and other substances. Use of rice hulls as fuel of fine granulation.

53. RAO, A. N., and RAO, S. N. G. Activated carbons from bagasse and other Indian raw materials. Indian Chem. Soc. Jour., Indus. & News Ed. 2: 161-170. 1939. 385 In27A
Chem. Abs. 34: 4239-4240. 1940.
C made from rice hulls, among other materials, had marked decolorizing properties toward caramel solutions and such other coloring and colloidal matter that may be present in sugar liquors.

54. REED, J. B., and LIEPSNER, F. W. The by-products of rice milling. U. S. Dept. Agr. Bul. 570, 16 p. Washington, D. C., 1917. 1 Ag84B
Chem. Abs. 11: 3346. 1917.
Analysis of byproducts of milling including rice hulls.

55. REISER, H. Clay products suitable for light bricks, etc. U. S. Pat. 1,945,232, Jan. 30, 1934.
Chem. Abs. 28: 2490. 1934.
The residuum obtained by burning rice hulls (suitably in a proportion of about 20-80%) is mixed with brick or potters clay.

56. RICE GROWERS ASSOCIATION OF CALIFORNIA. [Announcement.] Indus. and Engin. Chem., Indus. Ed. 36: 868. Sept. 1944. 381 J825
The above journal's "August's Headlines" for August 23 announces that the Association "will construct by-products plant to convert rice hulls into alcohol, glucose, wallboard, lignin, and a filler for plastics." - Entire item.

57. ROGERS, A. B. C. Preparing alcohol. Brit. Pat. 144,079, May 27, 1919.
Chem. Abs. 14: 2963. 1920.
Alcohol from rice hulls and straw.

58. ROMANA, C. C. S. Rice hull gas producer and engine. Sugar News 22: 347-348. Oct. 1941. 65.8 Su36
Chem. Abs. 36: 1164. 1942.
This gas can be used in a modified gasoline or alcohol type engine.

59. SAMANIEGO, R., and LEON, A. I. DE. Activated carbon from some agricultural waste products. Philippine Agr. 29: 275-295. Sept. 1940. Ref., p. 294. 25 P542
Chem. Abs. 35: 599. 1941.
57.48% raw carbon was the yield from rice hulls.

60. SCHMIDT, K. Gas producer construction for gasifying rice hulls, etc. Brit. Pat. 325,616, Dec. 5, 1928.
Chem. Abs. 24: 4140. 1930.

61. SCURTI, F. I cereali e le industrie chimico-agricole che essi alimentano. Cong. Naz. di Chim. Pura ed Appl., 2, Palermo, 1926. Atti 1: 317-326. 1927. 388 C763
Chem. Abs. 22: 4665. 1928.

Rice hulls, among other substances, contribute to some of the agricultural-chemical industries dependent upon cereals. Experiments show that rice hulls are composed of about 50% cellulose and 20% pentosans. Distillation with 30% H_2SO yields 4-5% furfural, 11% AcOH and 65% of a carbonaceous residue suitable for fuel. With the conversion of the cellulose into EtOH and the hemicellulose into furfural, rice hulls should offer the means of a profitable industry.

62. SCURTI, F., and ZAY, C. E. Distillazione della lolla di riso con acidi condensanti per la preparazione di solventi dell'acetilcellulosa. Staz. Sper. Agr. Ital. 52: 278-290. 1919. 105.4 St2
Chem. Abs. 14: 3673. 1920.
Abstract in Soc. Chem. Indus. Jour. 39: 441A. June 30, 1920. 382 M31
Distillation of rice hulls with condensing acids for the preparation of solvents of cellulose acetate. One kg. furnishes 40 gm. furfural and 110 gm. $NaC_2H_3O_2$.

63. SHILSTONE, H. M. Decolorizing carbon. U. S. Pat. 1,556,039, Oct. 6, 1925.
Chem. Abs. 19: 3571. 1925.
Fibrous rice material such as hulls, straw or chaff yields a product free from resinous materials.

64. SHILSTONE, H. M. Decolorizing sugar liquors with Carbrox, a carbon prepared from fibrous rice materials. La. Planter 58: 364-365. June 9, 1917. 65.8 L93
Chem. Abs. 11: 3459. 1917.
Description of a decolorizing substance from rice hulls.

65. *STEFANO, F. DI, and MUNTONI, F. Detection and determination of rice husk in bran, by rapid silica determination. Ann. di Chim. Appl. [Rome] 30: 527-533. 1940.
Chem. Abs. 35: 2618. 1941.
SiO_2 in rice hulls 18%.

66. SUZUKI, Z. Sulfur dye from rice hulls. U. S. Pat. 1,244,795, Oct. 30, 1917.
Chem. Abs. 12: 228. 1918.
The dye produced dyes cotton dark brown.

67. UTILIZATION of rice and its by-products. Gt. Brit. Imp. Inst. Bul. 16: 16-24. Jan./Mar. 1918. 26 G79
Chem. Abs. 12: 2391. 1918.
Hulls which contained 14.7% ash and 42% cellulose, treated with NaOH, gave a pulp containing much gelatinous material not easily removed, and it produced a weak brittle paper. Rice straw gave a good yield of pulp and a strong, opaque paper of excellent quality.

68. VAN VEEN, A. G. The rice problem. League of Nations. Health Organ. Bul. 9: 357-360. 1940/41. U. S. Natl. Inst. Health Libr.
Chem. Abs. 36: 5503-5504. 1942. Cf. 29: 4044-4045. 1935; 35: 8022. 1941.
Abstract in Trop. Dis. Bul. 39: 329. May 1942. 448.8 T752
General survey covering milled and husked rice, with particular reference to food in Java.

69. VAN VEEN, A. G. Rijskatoel als bij- en noodvoeding. Geneesk. Tijdschr. v. Nederland.-Indië 81: 1182-1193. June 3, 1941. U. S. Army Med. Libr.

Chem. Abs. 37: 1785-1786. 1943.
Rice bran as a supplemental food. Hulls are bitter.

70. VOLPATO, V. Preparing fiber from rice hulls, straw, and the like. French Pat. 484,762, Nov. 6, 1917.
Chem. Abs. 12: 1124. 1918.
Fiber freed from inorganic and glutinous matter.

71. WEST, A. P., and CRUZ, A. O. Philippine rice-mill products with particular reference to the nutritive value and preservation of rice bran. Philippine Jour. Sci. 52: 1-78. Sept. 1933. 475 P53
Chem. Abs. 28: 1418. 1934.
General summary with many footnote references. Includes hulls and straw.

72. WEST, C. J. Paper making trials at the Imperial Institute. Paper 28(11): 23-31; (12): 25-27, 39. May 18, 25, 1921. 302.8 P198
Chem. Abs. 15: 2983. 1921.
A review of certain bulletins of the Imperial Institute. Rice straw and hulls discussed in No. 12, p. 26.

73. WIEDEMANN, H. Utilizing rice waste. Brit. Pat. 185,083, Dec. 22, 1921.
Chem. Abs. 17: 189. 1923.
Waste subjected to dry distillation. Charcoal obtained is especially suitable for decolorizing and purifying purposes owing to its high content of silicic acid.

74. YANOVSKY, E. Extraction of hemicelluloses from plant materials; quantitative study. Indus. and Engin. Chem., Indus. Ed. 31: 95-100. Jan. 1939. 381 J825
Chem. Abs. 33: 1492. 1939.
Normal extraction curves obtained from rice hulls.

75. ZERBAN, F. W. More about rice hull carbon. La. Planter 59: 93-94. Aug. 11, 1917. 65.8 L93
Chem. Abs. 11: 3459. 1917.
This C removes 75 to 95% of the coloring matter found in various products by using only 1 to 3% C by weight.

76. ZERBAN, F. W., FREELAND, E. C., and SULLIVANT, D. D. Studies on the preparation of vegetable decolorizing carbons for the cane sugar industry. La. Agr. Expt. Sta. Bul. 167, 44 p. Baton Rouge, 1919. 100 L93
Chem. Abs. 13: 2295-2296. 1919.
Rice hulls very promising source of carbon.

RICE STRAW

77. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. I. The anaerobic decomposition of rice straw (Oryza sativa). Biochem. Jour. 29: 528-541. Mar. 1935. Ref. 382 B52
Chem. Abs. 29: 5212. 1935.
Only 0.1 part or less of available N is necessary for anaerobic decomposition while 0.7 parts is required under aerobic conditions for 100 g. of rice straw.

78. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. II. Some factors influencing the anaerobic decomposition of rice straw (Oryza sativa). Biochem. Jour. 29: 953-960. Apr. 1935. Ref. 382 B52
Chem. Abs. 29: 5583. 1935.
Optimum conditions for digestion of rice straw were pH 7,5-8, 30-5°, $KHCO_3$, or NH_4HCO_3 to neutralize the acids formed and 10 parts of H_2O to 1 part of straw.

79. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. III. Comparison of the course of decomposition of rice straw under anaerobic, aerobic and partially aerobic conditions. Biochem. Jour. 29: 1116-1120. May 1935. 382 B52
Chem. Abs. 29: 5885. 1935.
The rates of decomposition under aerobic, waterlogged, and anaerobic conditions decreased in that order.

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Chem. Abs. 29: 6277. 1935.
Concerning rice straw, the decomposition was studied in reference to loss of constituents, products formed, and N transformations.

81. AHMAD, N., and KARNIK, M. G. A technical survey of cellulose-bearing materials of India. Jour. Sci. and Indus. Res. 2: 275-290. June 1944. 475 J82
Chem. Abs. 39: 184. 1945.
Investigation to determine alpha-cellulose content of rice straw under optimum conditions of kier boiling and bleaching.

82. AKAGI, K. Uber den alkalischen aufschluss des strohs durch stuffenkochverfahren. (In Japanese.) Cellulose Indus. 15: 59-60. Feb. 1939. 309.8 C332
German abstract in Abstracts from the Transactions, p. 11
Chem. Abs. 34: 2592. 1940.
On the decomposition of straw with alkali through the multistage cooking process. Pulp from rice straw is described.

83. AHFT, P. Mineralizing organic fillers for light structural substances. Brit. Pat. 537,683, July 2, 1941.
Chem. Abs. 36: 2112. 1942.
The mineralized organic fillers, such as rice straw, unite with cement in such a way that a mass of great strength is formed.

84. *ARAKAWA, M., and AKAGI, K. The swelling value of rayon pulp. (In Japanese?) Rayon World [Osaka, Japan] 5(8): 4-6. 1937.
Chem. Abs. 35: 4949. 1941.
Pulp from rice plants has a very low swelling value and little practical value for rayon.

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Chem. Abs. 38: 1359. 1944.
Rice straw pulp consumes less Cl than other pulps bleached to the same brightness, possibly because of the high siliceous ash content.

86. ARONOVSKY, S. I., YOUNGER, J. O., and NELSON, G. H. Agricultural residue pulps for corrugating; effects of weathering and of various cooking conditions. Paper Trade Jour. 120(8): 124, 126, 128, 130, 132. Feb. 22, 1945. 302.8 P196
    Also in Paper Mill News 68(8): 102, 104, 106, 108, 110. Feb. 24, 1945. 302.8 P195
    Chem. Abs. 39: 1985-1986. 1945.
    Rice straw and other farm wastes for corrugated paper.

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    Chem. Abs. 27: 796-797. 1933.
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    Discussion, p. 482-486.
    Chem. Abs. 15: 3179. 1921.
    Plant being built in 1921 at Rangoon, India, for manufacture of power alcohol from rice straw.

89. *BELLADEN, L., and GALLIANO, G. The ash of rice chaff as raw material for refractory insulators. Metall. Ital. 33: 349-352. Aug. 1941.
    Chem. Abs. 37: 3895. 1943.
    Abstract in Chem. Zentbl. 113 (I. halbjahr): 2179. Apr. 29, 1942. 384 C42
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90. BHASKARAN, T. R., and PILLAI, S. C. Loss of biologically fixed nitrogen from soils and its bearing on crop production. Science (n. s.) 90: 595-596. Dec. 22, 1939. 470 Sci2
    Chem. Abs. 34: 2514. 1940.
    In the presence of rice straw, the loss of fixed N from the soil, after the addition of sugars and molasses, is prevented.

91. CHANG, H.-Y., HUNG, C.-C., and CHANG, Y.-K. Paper stock from plant stems. (In Chinese.) Indus. Center [Nanking] 3: 212-214. July, 1934. Calif. Univ. Libr.
    Chem. Abs. 30: 2754. 1936.
    Method of obtaining pulp from rice straw.

92. CHATTERJEE, I., and TALAPATRA, S. K. The lime and phosphorus requirements of Bengal cattle. Agr. and Livestock in India 8: 559-562. Sept. 1938. 22 Ag83A
    Chem. Abs. 33: 2563-2564. 1939.
    Assimilation poor from rice straw.

93. CHIAPPELLI, R. Sull' utilizzazione della paglia di riso come mangime al bestiame. Gior. di Risic. 10: 131-137. Sept. 30, 1920. 59.8 G43
    Chem. Abs. 16: 3986-3987. 1922.
    Abstract in Internatl. Rev. Sci. and Pract. Agr. [Rome] 11: 1322-1323. Nov./Dec. 1920. 241 In82
    Analysis of rice straw used as cattle fodder.

94. DARLING, E. R. (to Euromerican Cellulose Products Corp.). Cellulose pulp from corn stalks, straw, etc. Brit. Pat. 314,061, June 22, 1928.
Chem. Abs. 24: 1219. 1930.
Description of preparation of pulp from materials such as rice hulls and straw.

95. DESHPANDE, D. D. Power alcohol and paper from rice straw. Indian Inst. Sci. Jour. 13A: 93-109. 1930. 513 In23
Chem. Abs. 24: 4890. 1930.
The process gave 20-25 gal. of liquid fuel, mostly alcohol, and 8 cwt. of paper pulp from one ton of straw. Paper pulp was of good quality.

96. DUPONT, G., and ESCOURROU, R. Essais de cuisson de diverses matières cellulosiques. Chim. & Indus. [Paris] 47: 470-474. Apr. 1942. 383 C42
Chem. Abs. 37: 6123. 1943.
Abstract in Chem. Zentbl. 113 (2. halbjahr): 1648. Oct. 7, 1942. 384 C42
Cooking experiments with various cellulosic materials, including water rice.

97. ESPINO, R. B., and PANTALEON, F. T. Harmful effects upon young rice and maize plants of rice straw when added to clay loam soil in pots. Philippine Agr. 22: 534-556. Jan. 1934. Ref. 25 P542
Chem. Abs. 28: 2829. 1934.
After the straw had decomposed 75 days in the soil, it proved beneficial. The chemistry underlying these effects is discussed at length.

98. FERRARI, V. Basi teoriche e possibilità pratiche di una industria italiana per lo struttamento chimico dei materiali legnosi. Chimica 15: 531-538. Aug. 1939. 385 C44
Chem. Abs. 34: 4901. 1940.
Theoretical bases and practical possibilities of an Italian industry for the chemical utilization of ligneous matter, including rice straw. Outlines and charts are given.

99. FONTILLAS, S. M. Determination of furfural from some farm by-products. Philippine Agr. 30: 300-313. Sept. 1941. Ref., p. 308-309. 25 P542
Chem. Abs. 36: 2347. 1942.
From rice hulls mixed with broken kernels, 17.05%; whole rice hulls, 13.79; rice straw with rachis, 16.58%.

100. GALVEZ, N. L., and ROMERO, I. A. A study on the preparation of compost from rice straw. Philippine Agr. 29: 753-765. Feb. 1941. Ref., p. 763. 25 P542
Chem. Abs. 35: 5236. 1941.

101. HACHIHAMA, Y., and TAKEMURA, W. Studies on the bagasse, XI-XII. (In Japanese.) Soc. Chem. Indus. Japan. Jour. 40: 778-783. Oct. 1937. 385 J82
XI. On the picric acid isolated from the waste acid of nitric acid pulping process. XII. On the bagasse pulp prepared by the nitric acid process (Supplement).

English abstract in Supplemental Binding, p. 354B-355B.
Chem. Abs. 32: 1449. 1938. Cf. 31: 2423-2424. 1937.
Products obtained from the HNO_3 pulping process of rice straw.

102. HAVIK, G. Untersuchungen einiger rohstoffe für die halbstoff- und papierfabrikation auf Java. (Excerpts.) Papier Fabrik. 9: 245-248, 274-282. Mar. 3-10, 1911. 302.8 P197
French and English summaries.
Comments by A. Lutz, p. 276-277, 280-282.
Chem. Abs. 5: 2942. 1911.
Abstract in Soc. Chem. Indus. Jour. 30: 352. Mar. 31, 1911. 332 M31
Investigation of certain paper-making raw materials in Java gives comparison of yield and cost of production of paper from field and paddy straw.

103. HOSOTUZI, I. Biochemical study on "beni" dyeing. (In Japanese.) Chem. Soc. Japan. Jour. 61: 1275-1278. Dec. 1940. 385 T57J
Chem. Abs. 37: 3943-3944. 1943.
Dip silk in rice-straw ash solution and rice vinegar before dyeing. Serves as a mordant.

104. ISHII, K. Studies on the principal plant-fibres in Japan. (In Japanese.) Bot. Mag. [Tokyo] 35: (127)-(137). June 1921. 450 B651
Chem. Abs. 17: 1892. 1923.
Abstract in Jap. Jour. Bot. 1: (4). 1922. 450 J27
Constituents and dimensions of Japanese vegetable fibers including rice straw which shows 38.31% cellulose.

105. ITANO, A., and ARAKAWA, S. Some scientific consideration on the Itano process of composting. I. General description, nature of fermentation and sanitary significance. Ōhara Inst. f. Landw. Forsch. Ber. 3: 497-504. 1928. 107.6 Oh1
Chem. Abs. 22: 3480-3481. 1928.
The chemical composition of composts made from rice straw, barley straw, rice hulls, and weeds, average: total N 2.00 + K 1.44 and phosphates 0.85%

106. IWATA, H. On the disintegration of rice straw. Kyushu Imp. Univ. Dept. Agr. Jour. 1: 217-240. May 25, 1926. Ref., p. 236. 107.6 K995
Chem. Abs. 22: 3002. 1928.
Abstract in Expt. Sta. Rec. 58: 166. 1928. 1 Ex6R
As the lignin and Cl decreased the starch value increased, but not proportionately.

107. JENTGEN, H. Neue zellstoffe für die kunstfaserindustrie. Jentgen's Kunstseide u. Zellwolle 24: 350-364. Aug. 1942. U. S. Natl. Bur. Standards Libr.
Chem. Abs. 38: 2818-2819. 1944.
Abstract in Chem. Zentbl. 113 (2. halbjahr): 2222. Nov. 11, 1942. 384 C42
New cellulose pulps, such as that from rice straw, for the rayon industry. Pulping methods developed in different countries and experiences with them are described.

108. KIMURA, T. Untersuchungen über zellstoffe. XI-XIII. Mitteilung. Untersuchung über die herstellung von reis-stroh-zellstoff. III-V: Herstellung von zellstoff durch aufschliessen mit natronlauge. I-II; Herstellung von zellstoff durch sulfit-prozess. (In Japanese.) Cellulose Indus. 15: 105-112. Mar. 1939. 309.8 C332

German abstracts in Abstracts from the Transactions, p. 20-28.
Chem. Abs. 34: 2592. 1940.

Researches on cellulose concerned with preparation of pulp from rice straw by cooking with alkali, and by the sulfite process. The most satisfactory cooking conditions for preparing pulp from rice straw are 2 hours at 140° with 10 vols. of 1% aqueous NaOH, preceded by a cook at the same temperature with the spent liquor from the previous preparations.

109. KITA, G., NAGATA, S., and KIMURA, T. Reisstroh und seine verwertung als rohstoff für die herstellung von zellstoff. Papier-Fabrik., Tech.-Wiss. Teil 36: 198-199. 1938. 302.8 P197
Chem. Abs. 32: 6859. 1938.

Rice straw and its use as raw material in the production of pulp. Delignification with Cl gas and dilute NaOH gave pulp yields of 48% of which 75.8% was cellulose. Some straw was delignified first with spent aqueous NaOH and then with 1% NaOH - 37.7% pulp was obtained, of which 88% was cellulose.

110. KOMATSU, S., and others. Studies on celluloses. I-III. (In Japanese.) Soc. Chem. Indus. Japan. Jour. 34: 1236-1238. Dec. 1931. 385 J82
English abstracts in Supplemental Binding, p. 474B-476B.
Chem. Abs. 26: 3372-3373. 1932.

I. Rice straw cellulose, 1, by S. Komatsu and Y. Yamana. Rice straw treated separately with (1) 3% H_2SO_4; (2) superheated H_2O and (3) 7% NaOH solution gave yields of 37%, 32%, and 35% respectively.

II. Kaoliang cellulose, by S. Komatsu and M. Shimada. With and without pretreatment with H_2O at 180° (cellulose prepared by Cross and Bevan method). H_2O pretreatment apparently results in conversion of alpha- to beta-cellulose.

III. Rice straw cellulose, 2, by S. Komatsu and Y. Kinoshita. Crude cellulose prepared by chlorination. Yield about 30%, properties similar to celluloses produced from ramie and wood.

111. KUMAGAWA, H., and SHIMOMURA, K. Zur kenntnis der chemischen zusammensetzung und aufschliessbarkeit von zuckerrohrabfall (bagasse) und reisstroh. Ztschr. f. Angew. Chem. 36: 414-418. Aug. 8, 1923. 384 Z33
Chem. Abs. 17: 3419. 1923.

In discussion on chemical composition and digestibility of bagasse and rice straw, the following are some of the points on rice straw. NaOH plus Cl gave excellent white pulp with a yield of 35%. Rice straw contains 44.2% cellulose, high ash, 16%, and about 80% silica. The sulfate process gave good results, both cooking and bleaching easily, its yield being 35-40% white pulp. High ash content does not affect suitability for paper making, but yield is only 40-45%.

112. KUNO, Y. The influence of climate upon the composition of rice straws. (In Japanese.) Jour. Sci. Soil Manure, Japan 11: 123-132. Apr. 1937. 56.8 J27
English abstract, p. 131.
Chem. Abs. 31: 5088. 1937.

Chemical composition peculiarities resulting from unsuitable climatic conditions probably cause the frailty of the straw and thus the difficulty in working with it.

113. LONKAR, K. V., and RAO, S. N. G. Cane trash for card-board & wrapping papers manufacture. Indian Sugar 7: 69. Feb. 1944.
65.8 In25
Chem. Abs. 38: 3336. 1944.
Cane trash makes stronger cardboard and wrapping paper than rice straw.

114. LOPEZ, D. R., and GOMEZ, L. Notes on the utilization of rice straw. Philippine Univ. Nat. and Appl. Sci. Bul. 6: 103-107. Mar. 1938.
475 P532
Chem. Abs. 32: 8774. 1938.
Air-dry cellulose yield was 27.87% and final product contained 5.02% H_2O; 1.41% ash; 78.43% alpha-cellulose and had a Cu number of 1.15. Cellulose acetate was prepared from this pulp. Pulped with solution of Na_2CO_3, Na_2SO_4, $NaHSO_3$, and $ZnSO_4$.

115. MARSDEN, M. W. Fiber, etc., from rice-straw. U. S. Pat. 1,313,403, Aug. 19, 1919.
Chem. Abs. 13: 2767. 1919.
Byproducts of fiber making are alcohol and fertilizer.

116. MARSONI, S. Cellulose. Brit. Pat. 533,423, Feb. 13, 1941; Austral. Pat. 113,133, May 19, 1941.
Chem. Abs. 36: 1177, 3357. 1942.
Several kinds of straw, including rice straw, are washed. After maceration the resulting material is again washed, mechanically disintegrated, screened, and finally concentrated or dehydrated.

117. MURTI, P. B. R., and SESHADRI, T. R. Paper pulp from annual crops. Part I. Rice straw. Indian Acad. Sci. Proc. Sect. A. 12: 519-531. Dec. 1940. 513 In25
Chem. Abs. 35: 3439. 1941.
With straw containing 37.5% Cross and Bevan cellulose, the pulp yield is about 44%; this pulp contains 77-84% of alpha-cellulose and 6.5-9.6% lignin, with 3-4% ash.

118. MURTI, P. B. R. Paper pulp from annual crops. Part II. A note on the yields and characteristics of pulps from different varieties of rice straw. Indian Acad. Sci. Proc. Sect. A. 13: 564-565. June 1941. 513 In25
Chem. Abs. 35: 7708-7709. 1941.
Small differences in composition exist in varieties grown under the same conditions of soil and cultivation but more marked changes seem to be brought about by variations in these conditions.

119. NAGATA, S. Untersuchung über die herstellung des strourohzellstoffes. I. Mitteilung. Allgemeine zusammensetzung von reisstroh. (In Japanese.) Cellulose Indus. 13: 192-196. June 1937. 309.8 C332
German abstract in Abstracts from the Transactions, p. 30-31.
Chem. Abs. 32: 3605. 1938.
Describing preparations of crude straw cellulose giving general composition of rice straw.

120. NIKOLAEV, A. Vysokoskorostnaia gazifikatsiia mestnykh tverdykh topliv s malym nasypnym vesom. (In Russian.) Novosti Tekhniki 10(8): 13-15. April 1941. Libr. Cong.
Chem. Abs. 37: 5221. 1943.
Abstract in Chem. Zentbl. 113 (2. halbjahr): 734. Aug. 12, 1942. 384 C42
Rapid gasification of low-density solid fuels locally available, such as rice straw. The producer gas, with a heating value of 1100-1350 kg.-calories/cu. m., can be used in ordinary internal-combustion engines.

121. NOVELLI, N. Per una miglior utilizzazione della paglia da riso. Gior. di Risic. 5: 147-154. May 15, 1915. 59.8 G48
Chem. Abs. 10: 1238. 1916.
Abstract in Expt. Sta. Rec. 34: 72. 1916. 1 Ex6R
In studying a better utilization for rice straw, its average digestible nutrients were found to be: protein 1; fat 0.44; carbohydrates 28.63%. Ensiled rice straw desirable feed material.

122. OFFERMANNS, F. Muskauer fortlaufendes verfahren zum aufschluss von holz und einjahrespflanzen. Papierfabrik. Wchnbl. f. Papierfabrik., No. 2, p. 57-60. May 1943. 302.8 P1933
Chem. Abs. 38: 2488-2489. 1944.
The Muskau continuous process for pulping wood and annual plants. Data are given regarding strength tests on pulps, including that for rice straw, made by this process.

123. OLD, A. N. Chemical composition of some rice by-products. Agr. Gaz. N. S. Wales 51: 27. Jan. 1940. 23 N472
Chem. Abs. 34: 3834. 1940.
Analysis, for feed, of rice hulls and rice straw.

124. OSUGI, S., and YOSHIE, S. Decomposition of organic fertilizers. II. Relations between the chemical composition and decomposition. (In Japanese.) Agr. Chem. Soc. Japan. Jour. 6: 917-926. Oct. 1930. 385 Ag8
Chem. Abs. 25: 2231. 1931.
Decomposition of rice straw rapid during the first 17 days.

125. OSUGI, S., and YOSHIE, S. On the constituents of manures and the rate of their decomposition in soil. Kyoto Imp. Univ. Col. Agr. Mem., No. 12, p. 41-57. Feb. 1931. 107.6 K994
Chem. Abs. 25: 3759-3760. 1931.
No organic N. decomposition in rice straw was noticed on account of the marked assimilation of solution N by microörganisms. Analysis given.

126. PATWARDHAN, V. N. Fermentation of rice straw by Bacillus acetoethylicus. Indian Chem. Soc. Jour. 7: 531-536. June 1930. 385 In27
Chem. Abs. 25: 311-312. 1931.
Alcohol-acetone yield too low to make process practical.

127. POMILIO, U. Extraction of cellulosic fibers from vegetable material. Brit. Pat. 489,302, July 25, 1938.
Chem. Abs. 33: 378. 1939.
Semi-pulp suitable for paper making and cardboard from rice straw, among other substances.

128. PORTUGAL, N. C., and GOMEZ, L. Notes on the utilization of rice straw (an extension of the work of D. R. Lopez and L. Gomez). Philippine Univ. Nat. Appl. Sci. Bul. 7: 29-32. July 1939. 475 P532
Chem. Abs. 34: 261. 1940. *Cf.* 32: 8774. 1938.
Unbleached yield 37.9%; bleached yield 26%; cellulose content 92%; pentosans 15-16%; alpha-cellulose content 91.5% (based on cellulose) and Cu no. 0.04-0.05. Papers were prepared which had good tearing resistance.

129. REYES, F. D., and CRUZ, A. O. Cogon and rice straw as raw material for paper manufacture. Philippine Jour. Sci. 38: 367-376. Apr. 1929. 475 P53
Chem. Abs. 23: 4818. 1929.
Milder digestion used for rice straw than for cogon. Cellulose content for rice straw 42%.

130. ROGERS, A. B. C. Preparing alcohol. Brit. Pat. 144,079, May 27, 1919.
Chem. Abs. 14: 2963. 1920.
Alcohol from rice hulls and straw.

131. SAEGUSA, H. (to ŌSAKA TOGYO K. K.) Rayon pulp from Graminaceae, such as rice straw. Jap. Pat. 131,380, July 27, 1939.
Chem. Abs. 35: 1993. 1941.
Method described.

132. SANSONE, R. Die verarbeitung von reisstroh zu zellstoff und papier. Papierfabrik. Wchnbl. f. Papierfabrik., No. 4, p. 143-146. July 4, 1943. 302.8 P1933
Chem. Abs. 38: 5081. 1944.
The manufacture of pulp and paper from rice straw. Is satisfactory for cigarette and similar papers.

133. SARAO, F. B. Value of Philippine composts. Philippine Agr. and Forester 6: 128-134. Jan./Feb. 1918. 25 P542
Chem. Abs. 13: 1120-1121. 1919.
Abstract in Expt. Sta. Rec. 39: 523. 1918. 1 Ex6R
Rice straw composts very rapidly.

134. SENGUPTA, P. N., and SEN, H. K. Studies on ligno-cellulose. Sci. and Cult. 3: 442. Feb. 1938. 475 Sci24
Chem. Abs. 32: 3605-3606. 1938.
Rice straw: 24.2% lignin; 9.9% AcOH; 44.6% cellulose (on dry basis).

135. SETTON, D. Fibers from rice straw. Russ. Pat. 44,634, Oct. 31, 1935.
Chem. Abs. 32: 3170. 1938.
Straw boiled in H_2O for 10-15 minutes, treated 30 minutes at 40-50° with a solution containing 7-9 gm. NaOH per l., treated with soap, machine oil, and caustic, and combed.

136. SHILSTONE, H. M. Decolorizing carbon. U. S. Pat. 1,556,039, Oct. 6, 1925.
Chem. Abs. 19: 3571. 1925.
Fibrous rice material such as hulls, straw or chaff yields a product free from resinous materials.

137. SIMODA, I. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. II-III. Mitteilung. Aufschliessung des reisstrohs mit verdünnter salpetersäure I-II. (In Japanese.) Cellulose Indus. 12: 39-47, 71-75. Feb.-Mar. 1936. 309.8 C332

German abstracts in Abstracts from the Transactions, p. 7-13, 15-19.

Chem. Abs. 30: 5411, 7843. 1936.

This study on the preparation of cellulose pulp by the nitric acid process deals with the decomposition of rice straw with dilute nitric acid. Concentrated HNO_3 of 2% or more should be used in the cooking. The yield of cellulose is 32% of the straw.

138. SIMODA, I., and YOSINO, K. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. VII. Mitteilung. Uber die wirkungen von salpetersäure, schwefelsäure und mischsäure auf reisstroh. (In Japanese.) Cellulose Indus. 14: 450-452. Dec. 1938. 309.8 C332

German abstract in Abstracts from the Transactions, p. 81-84.

Chem. Abs. 33: 8403. 1939.

Deals with the action of nitric acid, sulfuric acid, and mixed acids on rice straw. By using mixture of concentrated HNO_3 and H_2SO_4, a considerable economy of HNO_3 was achieved.

139. SIMODA, I., and MURAKOSHI, T. Herstellung des salpetersäureaufschlussverfahren. VIII. Mitteilung. Aufschliessung von reisstroh mit salpetersäure und mischsäure. (In Japanese.) Cellulose Indus. 15: 7-9. Jan. 1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 2-5.

Chem. Abs. 34: 1846. 1940.

Deals with the decomposition of rice straw with nitric acid and mixed acids. Attempts were made to produce HNO_3 pulp for rayon. The ash content was greater than that of commercial sulfite pulps. With 5% HNO_3 alone the pulp yield was about 31%, while with the mixed acids it was reduced to about 28%.

140. SIMODA, I. Herstellung von zellstoff im salpetersäureaufschlussverfahren. IX. Mitteilung. Auffrischung und wiederverwendung der säureablauge beim aufschluss von reisstroh mit salpetersäure. (In Japanese.) Cellulose Indus. 15: 378-379. Sept. 1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 75-76.

Chem. Abs. 34: 4566. 1940.

Deals with the recovery and re-use of nitric acid liquor in the digestion of rice straw. Liquor re-used three times produced no deterioration in the alpha-cellulose. Content of pentosans and ash tended to increase.

141. SIMODA, I. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XI. Mitteilung. Aufschliessung von reisstroh durch dreistuffenaufschlussverfahren. (In Japanese.) Cellulose Indus. 15: 470-474. Nov. 1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 83-87.

Chem. Abs. 34: 6066. 1940.

Deals with three-state hydrolysis of rice straw. The yield and ash content are less than, the pentosan content is greater than, and the consumption of HNO_3 is much less than when the first stage is omitted.

142. SIMODA, I. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XII. Mitteilung. Salpetersäure-reisstrohzellstoff als rohstoff von kunstfaser unter besonderer berücksichtigung der heterogenität der viskosität. (In Japanese.) Cellulose Indus. 16: 6-8. Jan. 1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 1-4.
Chem. Abs. 35: 2717. 1941.

Deals with the heterogeneity of nitric acid rice-straw pulp with respect to viscosity. Rice-straw-straw pulp and a commercial sulfite wood pulp are fairly closely similar in molecular chain-length distribution.

143. SIMODA, I. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XIII. Mitteilung. Über die asche von reisstroh und die einflüsse von salpetersäurebehandlung auf die asche. (In Japanese.) Cellulose Indus. 16: 127-128. Apr. 1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 15-17.
Chem. Abs. 35: 3814. 1941.

Deals with the ash of rice straw and the effect of nitric acid on it. The ash of rice straw is almost completely removed in the 3-stage HNO_3 process.

144. SIMODA, I., and KONO, M. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XIV. Mitteilung. Herstellung von reisstrohzellstoff unter berücksichtung der herstellungskosten. (In Japanese.) Cellulose Indus. 16: 328-335. Oct. 1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 37-38.
Chem. Abs. 35: 5695. 1941.

Deals with the manufacture of pulp from rice straw with a view to the production cost. By using undiluted HNO_3 or NO_2 gas and restrengthening the soda solution with lime the cost may be brought down to 10-11 sen per pound.

145. SIMODA, I., and KONO, M. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XVI. Mitteilung. Uber die möglichkeit zur gewinnung von furfurol und zellstoff aus reisstroh. (In Japanese.) Cellulose Indus. 17: 78-80. Feb. 1941. 309.8 C332

German abstract in Abstracts from the Transactions, p. 15-17.
Chem. Abs. 35: 5695. 1941.

Deals with the possibility of obtaining furfural and cellulose from rice straw. It is possible to obtain them simultaneously.

146. SIMODA, I., and KONO, M. Herstellung des zellstoffes im salpetersäureaufschlussverfahren. XVII. Mitteilung. Herstellung der viskose aus salpetersäurezellstoff aus reisstroh. (In Japanese.) Cellulose Indus. 17: 233-237. June 1941. 309.8 C332

German abstract in Abstracts from the Transactions, p. 42-44.
Chem. Abs. 36: 2136, 4334. 1942.

Deals with the manufacture of viscose from nitric acid pulp prepared from rice straw. Thread made from rice straw viscose was as satisfactory as that made from coniferous-wood viscose. Rice-straw thread not as white as coniferous-wood thread.

147. SIMOMURA, Y. Pulp from rice straw. Jap. Pat. 134,-114, Jan. 9, 1940.

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155. TAKETOMI, M. Production of alcohol from rice straw. (In Japanese.) Soc. Chem. Indus. [Japan] Jour. 29: 43-47. Jan. 1926. 385 J82

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